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Metal Industry Indicators

Indicators of Domestic Primary Metals, Steel, Aluminum, and Copper Activity

May 2003

The growth rate of the primary metals leading index is in the range that points to a near-term downward trend in industry activity. The leading index of metal prices moved lower in March.

The **primary metals leading index** declined 1.4% in April to 125.7 from a revised 127.5 in March. The index's 6-month smoothed growth fell to –4.5% from a revised –2.1% in March. The 6-month smoothed growth rate is a compound annual rate that measures the near-term trend. Normally, a growth rate below –1.0% signals a downward trend for future growth in metals activity, while a growth rate above +1.0% indicates an upward trend.

The April index value should be considered preliminary because only four of the index's eight components were available in time for its computation. A 0.8-hour reduction in the length of the average workweek in primary metals establishments, this component's second largest decrease in the last 20 years, made the biggest negative contribution to the net decrease in the leading index. The JOC-ECRI metals price index growth rate and the Institute for Supply Management's PMI, an index of manufacturing activity, also registered declines. In contrast, the stock price component, which combines the S&P stock price indexes for construction and farm machinery companies and for industrial machinery companies, posted a sizable gain.

The growth rate of the primary metals leading index is now in the range that forecasts a near-term downward trend in industry activity.

The **steel leading index** registered its third consecutive monthly decrease in March, the latest month for which it is available. It moved down to 109.3 from 110.5 in February, a decline of 1.1%. The index's 6-month smoothed growth rate sank to –5.1% in March, its lowest reading since January 2001. Led by the PMI, five of the index's nine components came in with substantial decreases in March. The growth rate of the steel leading index points to declining growth in U.S. steel industry activity in the coming months.

The **aluminum mill products leading index** plummeted 2.6% in March, its largest 1-month drop since January 1987. The index's 6-month smoothed growth rate fell to –4.3% from a revised 0.4% in February. Six of the index's seven components moved down in March, with the largest decrease coming from commercial and industrial construction contracts, which posted its sharpest percentage decrease since 1953. The PMI, the growth rate of the inflation-adjusted U.S. M2 money supply, and the index of new housing permits also posted substantial declines. The growth rate of the aluminum mill products leading index has fallen dramatically, suggesting weaker growth in the U.S. aluminum mill products industry in the short term.

The **primary aluminum leading index** increased 0.5% in March to 86.0 from a revised 85.6 in February, and the index's 6-month smoothed growth rate moved up to 6.5% from a downwardly revised 6.3%. The length of the average workweek in primary aluminum establishments, which advanced to another record high for this indicator, was again responsible for most of the net increase in the leading index. Although the growth rate of the primary aluminum leading index has been relatively high over the past 5 months, its strength is largely the result of just the average workweek component. Consequently, the domestic primary aluminum industry may not grow as rapidly as the leading index suggests.

The **copper leading index** dropped –1.7% in March, down to 112.6 from 114.6 in February. The index's 6-month smoothed growth rate slumped to –6.2% from a revised –3.6% in February, its lowest growth rate since October 2000. Three components, average weekly overtime hours in copper rolling, drawing, and extruding establishments, the index of new housing permits, and the spot price of copper on the London Metal Exchange, accounted for nearly all of the net decrease in the leading index. The growth rate of the copper leading index continues to signal a downward trend in growth for the U.S. copper industry in the near future.

Metals Price Leading Index Edges Lower

The **metals price leading index** decreased 0.2% in March, the latest month for which it is available, moving down to 110.3 from a revised 110.5 in February. The index's 6-month

smoothed growth rate slowed to –2.3% from a revised –2.0% in February.

As is normally the case, only three of the leading index's four components were available in time to compute the index value for the latest month. The growth rate of the index measuring the trade-weighted average exchange value of other major currencies against the U.S. dollar made the largest negative contribution to the net decrease in the leading index. However, the index of other currencies against the U.S. dollar continues to increase as the dollar weakens, but it is increasing at a slower rate. The yield spread between the U.S. 10-year Treasury Note and the federal funds rate moved lower, while the growth rate of the inflation-adjusted value of new orders for U.S. nonferrous metal products posted a modest increase.

The fourth component, the growth rate of the Economic Cycle Research Institute's (ECRI) 18-Country Long Leading Index, was available only through February, when it registered a modest decrease. The ECRI index signals economic activity for major industrialized countries about 5 months in advance.

The growth rate of the inflation-adjusted value of inventories of U.S. nonferrous metal products, which typically moves inversely with metal prices, decreased in March, dipping to –14.3% from a revised –13.5% in February. The level of these inventories remains very low by historical standards.

The growth rate of the metals price leading index continues to point to weak growth in overall metal prices in the short term. However, weakness in the foreign exchange value of the U.S. dollar may prop up metals prices. The business cycle, foreign exchange rates, and inventories are only three factors in metals price determination. Other factors that affect prices include changes in metals production, speculation, strategic stockpiling, geopolitical instability, and production costs.

Table 1.
Leading Index of Metal Prices and Growth Rates of the Nonferrous Metals Price Index, Inventories of Nonferrous Metal Products, and Selected Metal Prices

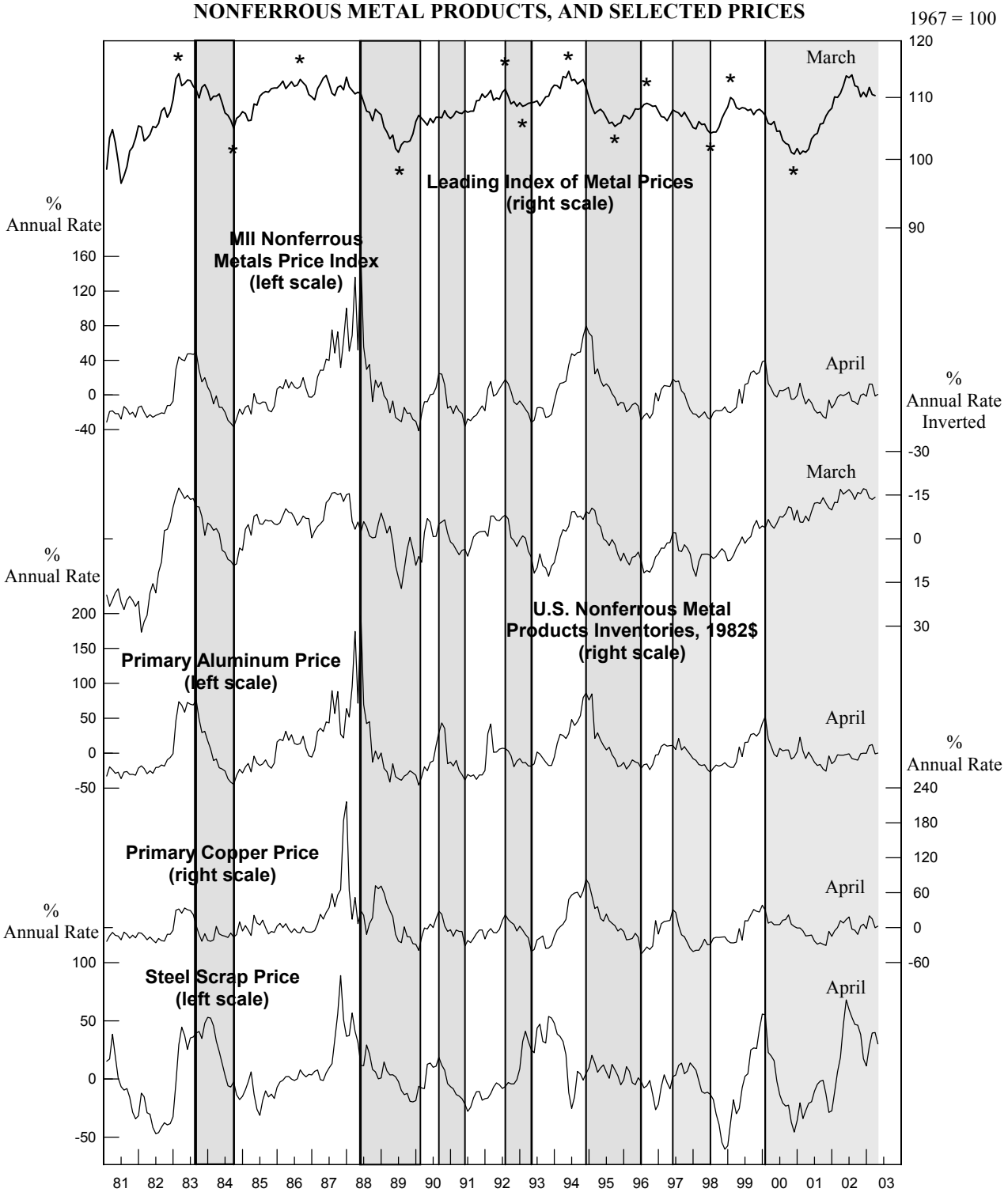
		Six-Month Smoothed Growth Rates				
	Leading Index of Metal Prices (1967=100)	MII Nonferrous Metals Price Index	U.S. Nonferrous Metal Products Inventories (1982$)	Primary Aluminum	Primary Copper	Steel Scrap
2002						
March	110.7r	0.5	-17.0	-3.0	12.0	18.5
April	112.0	-0.9	-15.3	-2.9	7.7	46.4
May	113.7r	0.9	-16.1	-1.8	13.8	68.0
June	113.4r	3.3	-16.9	-0.9	18.3	59.8
July	113.9r	-6.9	-15.7	-7.7	-2.5	52.9
August	112.0r	-8.0	-13.5	-8.9	-4.8	46.8
September	111.8r	-11.0	-15.9	-10.1	-11.7	46.2
October	110.1	-0.5	-15.5	-0.8	2.3	38.2
November	110.9r	1.3	-17.2r	0.0	5.7	17.4
December	110.1r	-1.6	-16.8	-0.4	-1.8	11.2
2003						
January	111.7r	12.7	-14.0	10.8	20.2	27.8
February	110.5r	12.4	-13.5r	12.4	14.9	39.5
March	110.3	-1.1	-14.3	-1.0	-0.3	40.0
April	NA	0.7	NA	0.1	2.3	30.1

NA: Not available r: Revised

Note: The components of the Leading Index of Metal Prices are the spread between the U.S. 10-year Treasury Note and the federal funds rate, and the 6-month smoothed growth rates of the deflated value of new orders for nonferrous metal products, the Economic Cycle Research Institute's 18-Country Long Leading Index, and the reciprocal of the trade-weighted average exchange value of the U.S. dollar against other major currencies. The Metal Industry Indicators (MII) Nonferrous Metals Price Index measures changes in end-of-the-month prices for primary aluminum, copper, lead, and zinc traded on the London Metal Exchange (LME). The steel scrap price used is the price of No. 1 heavy melting. Inventories consist of the deflated value of finished goods, work in progress, and raw materials for U.S.-produced nonferrous metal products (NAICS 3313, 3314, & 335929). Six-month smoothed growth rates are based on the ratio of the current month's index or price to its average over the preceding 12 months, expressed at a compound annual rate.

Sources: U.S. Geological Survey (USGS); American Metal Market (AMM); the London Metal Exchange (LME); U.S. Census Bureau; the Economic Cycle Research Institute, Inc. (ECRI); and Federal Reserve Board.

CHART 1.
LEADING INDEX OF METAL PRICES AND GROWTH RATES OF NONFERROUS METALS PRICE INDEX, INVENTORIES OF NONFERROUS METAL PRODUCTS, AND SELECTED PRICES



Shaded areas are downturns in the nonferrous metals price index growth rate. Asterisks (*) are peaks and troughs in the economic activity reflected by the leading index of metal prices. Scale for nonferrous metal products inventories is inverted.

U.S. Geological Survey, May 2003

Table 2.
The Primary Metals Industry Indexes and Growth Rates

	Leading Index		Coincident Index	
	(1977 = 100)	Growth Rate	(1977 = 100)	Growth Rate
2002				
May	130.0	5.5	101.4	-2.0
June	130.1	4.9	101.3	-1.4
July	128.2	1.7	100.7	-2.0
August	128.4	1.5	101.7	0.5
September	127.4	-0.2	100.5	-1.1
October	128.6	1.4	101.6	1.3
November	128.6	0.6	100.7	-0.2
December	129.9	2.1	100.6	-0.4
2003				
January	129.3	0.6r	101.0	0.1r
February	129.2r	0.3r	100.4	-1.0r
March	127.5r	-2.1r	100.8	-0.4
April	125.7	-4.5	NA	NA

NA: Not available **r:** Revised

Note: Growth rates are expressed as compound annual rates based on the ratio of the current month's index to the average index during the preceding 12 months.

Table 3.
The Contribution of Each Primary Metals Index Component to the Percent Change in the Index from the Previous Month

Leading Index	**March**	**April**
1. Average weekly hours, primary metals (SIC 33)	0.3r	-1.8
2. Weighted S&P stock price index, machinery, construction and farm and industrial (December 30, 1994=100)	0.1r	1.0
3. Ratio of price to unit labor cost (SIC 33)	-0.2	NA
4. JOC-ECRI metals price index growth rate	-0.1r	-0.6
5. New orders, primary metal products, (NAICS 331 & 335929) 1982$	-0.2	NA
6. Index of new private housing units authorized by permit	-0.3	NA
7. Growth rate of U.S. M2 money supply, 1996$	-0.4	NA
8. PMI	-0.6r	-0.2
Trend adjustment	0.0	0.0
Percent change (except for rounding differences)	-1.4r	-1.6

Coincident Index	**February**	**March**
1. Industrial production index, primary metals (NAICS 331)	-0.1r	-0.2
2. Total employee hours, primary metals (SIC 33)	0.1r	0.3
3. Value of shipments, primary metals products, (NAICS 331 & 335929) 1982$	-0.6r	0.1
Trend adjustment	0.1	0.1
Percent change (except for rounding differences)	-0.5r	0.3

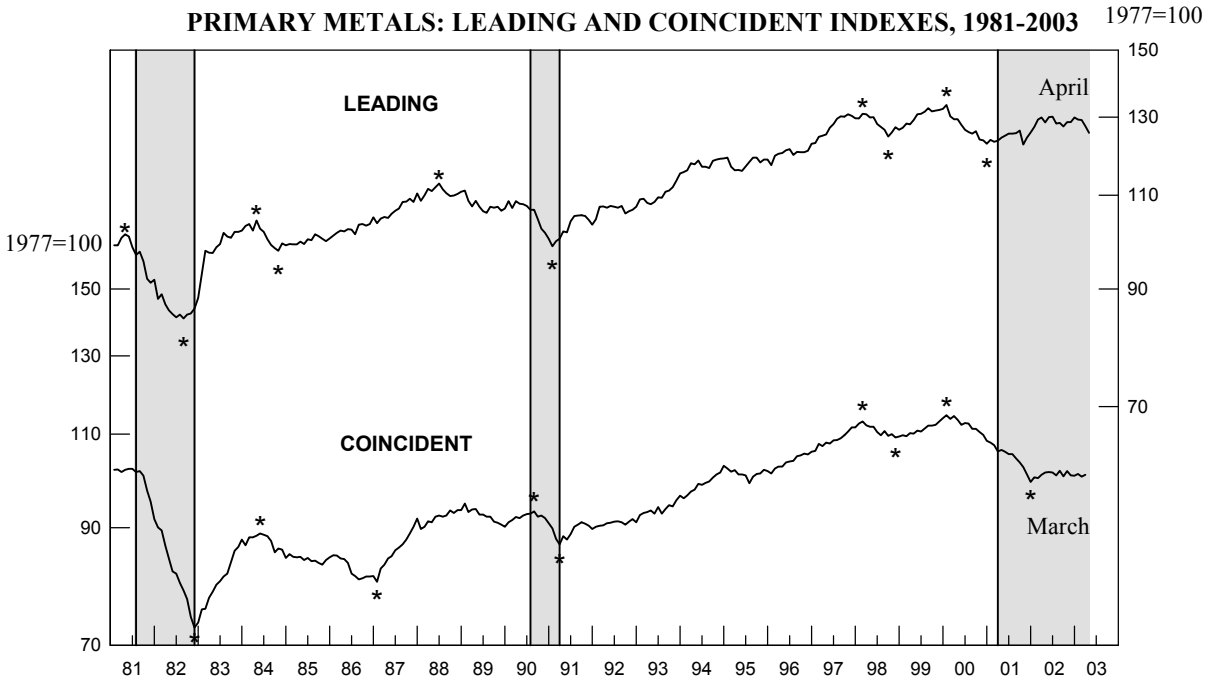
Sources: Leading: 1, Bureau of Labor Statistics; 2, Standard & Poor's and U.S. Geological Survey; 3, U.S. Geological Survey; 4, Journal of Commerce and Economic Cycle Research Institute, Inc.; 5, U.S. Census Bureau and U.S. Geological Survey; 6, U.S. Census Bureau and U.S. Geological Survey; 7, Federal Reserve Board, Conference Board, and U.S. Geological Survey; and 8, Institute for Supply Management. Coincident: 1, Federal Reserve Board; 2, Bureau of Labor Statistics and U.S. Geological Survey; 3, U.S. Census Bureau and U.S. Geological Survey. All series are seasonally adjusted, except 2, 3, and 4 of the leading index.

NA: Not available **r:** Revised

Note: A component's contribution, shown in Tables 3, 5, 7, and 9, measures its effect, in percentage points, on the percent change in the index. Each month, the sum of the contributions plus the trend adjustment equals (except for rounding differences) the index's percent change from the previous month.

CHART 2.

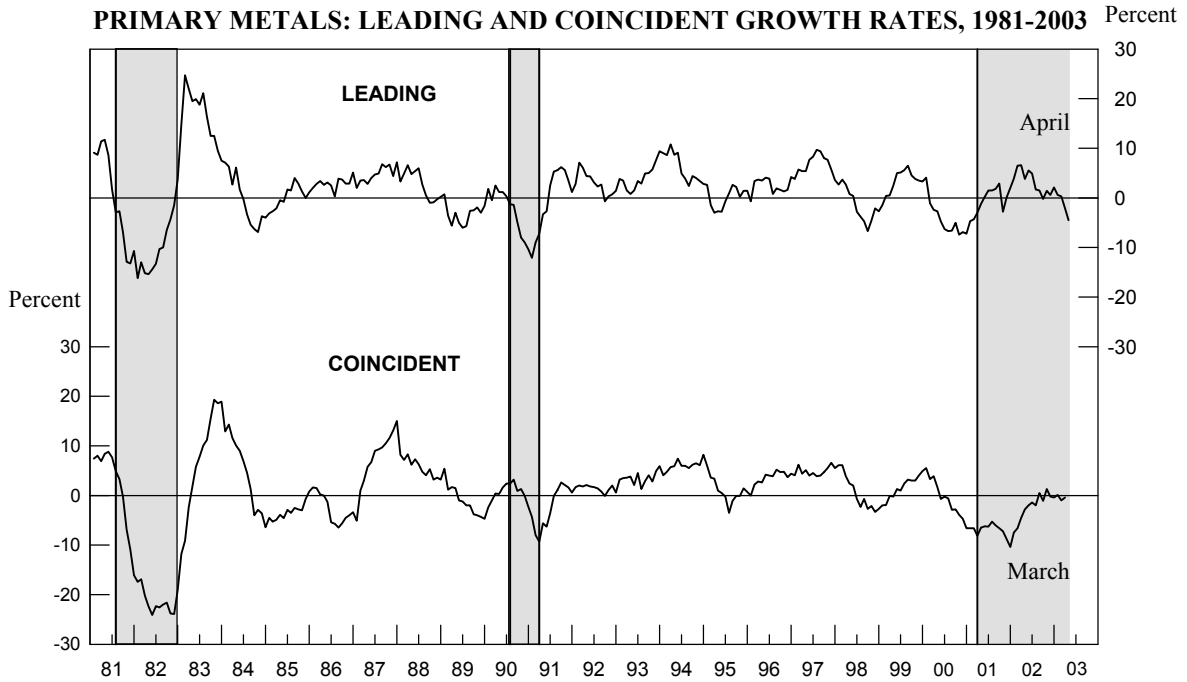
PRIMARY METALS: LEADING AND COINCIDENT INDEXES, 1981-2003



Shaded areas are business cycle recessions. Asterisks (*) signify peaks (the end of an expansion) and troughs (the end of a downturn) in the economic activity reflected by the indexes.

CHART 3.

PRIMARY METALS: LEADING AND COINCIDENT GROWTH RATES, 1981-2003



Shaded areas are business cycle recessions.

The growth rates are expressed as compound annual rates based on the ratio of the current month's index to its average level during the preceding 12 months.

U.S. Geological Survey, May 2003

Table 4.
The Steel Industry Indexes and Growth Rates

	Leading Index		Coincident Index	
	(1977 = 100)	Growth Rate	(1977 = 100)	Growth Rate
2002				
April	111.9	1.7	94.8	-2.3
May	113.3	3.7	95.6	-0.3
June	113.7	3.7	95.5	0.0
July	113.4	2.7	95.3	-0.1
August	112.8	1.4	96.6	2.9
September	111.9	-0.4	95.9	1.4
October	111.8	-0.5	96.7	3.1
November	112.0	-0.5r	95.8r	1.4r
December	114.5	3.5	96.3	2.2
2003				
January	111.3	-2.3	95.6r	0.2r
February	110.5	-3.5	95.0r	-1.1r
March	109.3	-5.1	95.3	-0.6

r: Revised

Note: Growth rates are expressed as compound annual rates based on the ratio of the current month's index to the average index during the preceding 12 months.

Table 5.
The Contribution of Each Steel Index Component to the Percent Change in the Index from the Previous Month

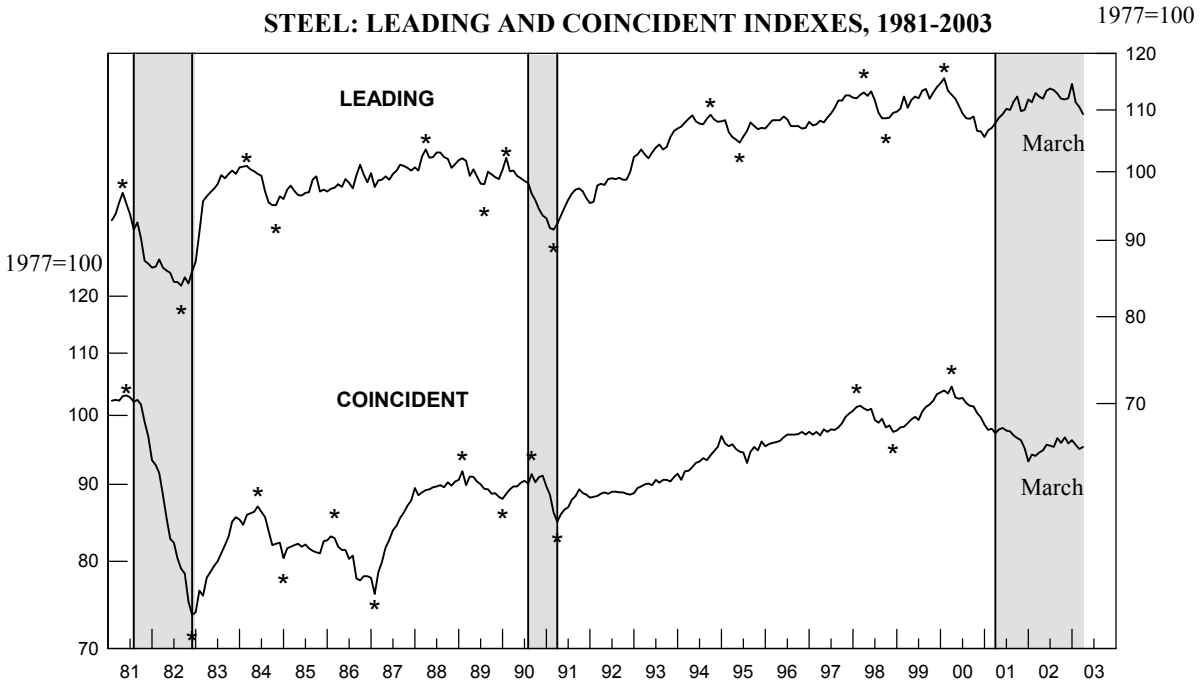
Leading Index	February	March
1. Average weekly hours, blast furnaces and basic steel products (SIC 331)	0.2	0.4
2. New orders, iron and steel mills (NAICS 3311 & 3312), 1982$	0.0	-0.4
3. Shipments of household appliances, 1982$	0.0r	0.3
4. S&P stock price index, steel companies	-0.6	-0.3
5. Retail sales of U.S. passenger cars and light trucks (units)	-0.2	0.2
6. Growth rate of the price of steel scrap (#1 heavy melting, $/ton)	0.1	0.0
7. Index of new private housing units authorized by permit	0.1	-0.3
8. Growth rate of U.S. M2 money supply, 1996$	0.1	-0.4
9. PMI	-0.4	-0.6
Trend adjustment	0.0	0.0
Percent change (except for rounding differences)	-0.7r	-1.1
Coincident Index		
1. Industrial production index, iron and steel products (NAICS 3311 & 3312)	-0.2r	-0.3
2. Value of shipments, iron and steel mills (NAICS 3311 & 3312), 1982$	-0.5r	0.1
3. Total employee hours, blast furnaces and basic steel products (SIC 331)	0.0	0.5
Trend adjustment	0.1	0.1
Percent change (except for rounding differences)	-0.6r	0.4

Sources: Leading: 1, Bureau of Labor Statistics; 2, U.S. Census Bureau and U.S. Geological Survey; 3, U.S. Census Bureau and U.S. Geological Survey; 4, Standard & Poor's; 5, U.S. Bureau of Economic Analysis and American Automobile Manufacturers Association; 6, Journal of Commerce and U.S. Geological Survey; 7, U.S. Census Bureau and U.S. Geological Survey; 8, Federal Reserve Board, Conference Board, and U.S. Geological Survey; and 9, Institute for Supply Management. Coincident: 1, Federal Reserve Board; 2, U.S. Census Bureau and U.S. Geological Survey; 3, Bureau of Labor Statistics and U.S. Geological Survey. All series are seasonally adjusted, except 4 and 6 of the leading index.

r: Revised

CHART 4.

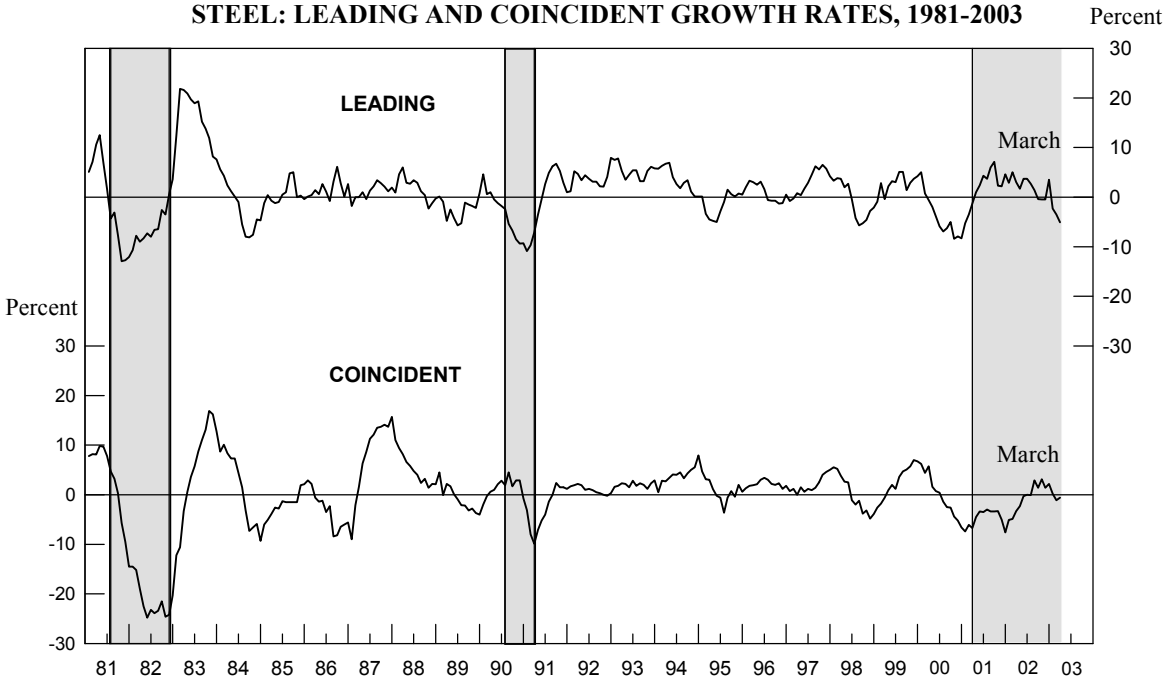
STEEL: LEADING AND COINCIDENT INDEXES, 1981-2003



Shaded areas are business cycle recessions. Asterisks (*) signify peaks (the end of an expansion) and troughs (the end of a downturn) in the economic activity reflected by the indexes.

CHART 5.

STEEL: LEADING AND COINCIDENT GROWTH RATES, 1981-2003



Shaded areas are business cycle recessions.

The growth rates are expressed as compound annual rates based on the ratio of the current month's index to its average level during the preceding 12 months.

U.S. Geological Survey, May 2003

Table 6.
The Aluminum Mill Products Industry Indexes and Growth Rates

	Leading Index		Coincident Index	
	(1977 = 100)	Growth Rate	(1977 = 100)	Growth Rate
2002				
April	170.0	0.8	143.5	1.8
May	171.5	2.0	142.9	1.2
June	171.7	1.6	144.2	2.9
July	171.2	0.6	142.6	0.6
August	170.5	-0.4	143.5	1.9
September	169.3	-1.9	144.2	2.6
October	168.0	-2.9	142.0	-0.5
November	169.5	-1.1	142.6	0.4
December	172.7	2.4	143.4	1.2
2003				
January	172.2	1.6	143.8r	0.0r
February	171.3r	0.4r	142.3r	-0.9r
March	166.8	-4.3	142.5	-0.9

r: Revised

Note: Growth rates are expressed as compound annual rates based on the ratio of the current month's index to the average index during the preceding 12 months.

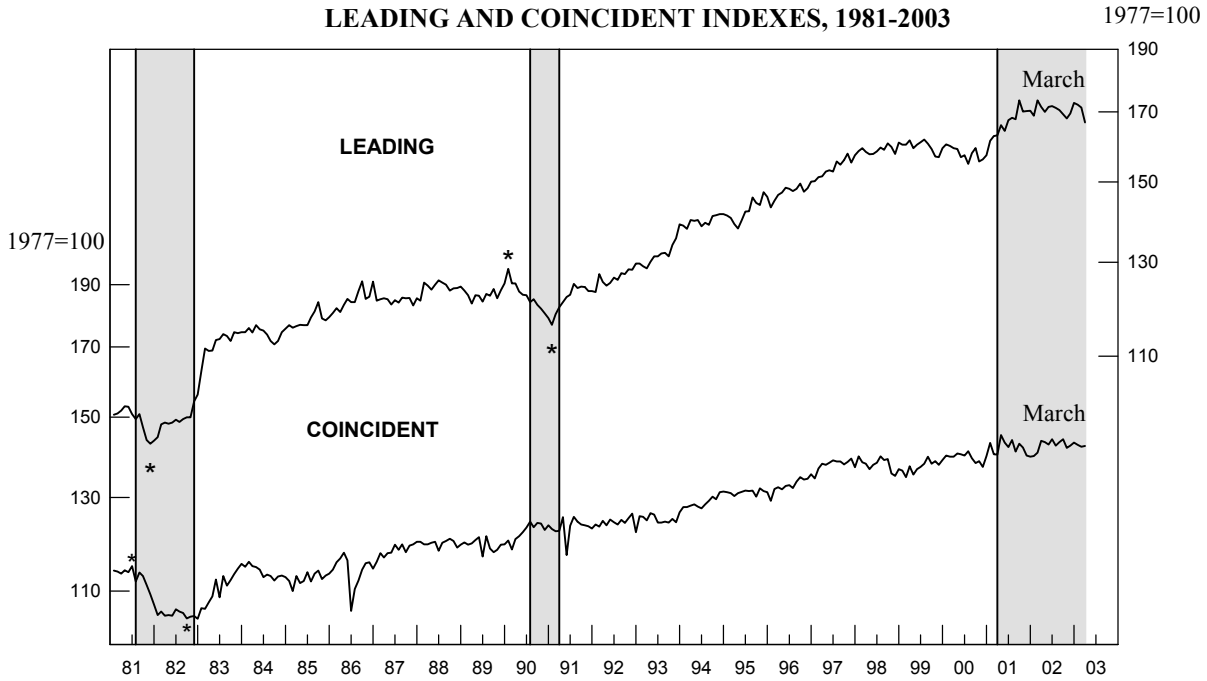
Table 7.
The Contribution of Each Aluminum Mill Products Index Component to the Percent Change in the Index from the Previous Month

Leading Index	**February**	**March**
1. Average weekly hours, aluminum sheet, plate, and foil (SIC 3353)	-0.5	-0.2
2. Index of new private housing units authorized by permit	0.1r	-0.4
3. Retail sales of U.S. passenger cars and light trucks (units)	-0.3	0.2
4. Construction contracts, commercial and industrial (square feet)	0.5	-1.1
5. Net new orders for aluminum mill products (pounds)	-0.1r	-0.2
6. Growth rate of U.S. M2 money supply, 1996$	0.1	-0.5
7. PMI	-0.5	-0.7
Trend adjustment	0.2	0.2
Percent change (except for rounding differences)	-0.5r	-2.7
Coincident Index		
1. Industrial production index, misc. aluminum materials (NAICS 331315,9)	0.0r	-0.1
2. Total employee hours, aluminum sheet, plate, and foil (SIC 3353)	-0.5	0.1
Trend adjustment	0.2	0.2
Percent change (except for rounding differences)	-0.3r	0.2

Sources: Leading: 1, Bureau of Labor Statistics; 2, U.S. Census Bureau and U.S. Geological Survey; 3, U.S. Bureau of Economic Analysis and American Automobile Manufacturers Association; 4, F.W. Dodge, Division of McGraw-Hill Information Systems Company; 5, The Aluminum Association, Inc. and U.S. Geological Survey; 6, Federal Reserve Board, Conference Board, and U.S. Geological Survey; 7, Institute for Supply Management. Coincident: 1, Federal Reserve Board; 2, Bureau of Labor Statistics and U.S. Geological Survey. All series are seasonally adjusted.

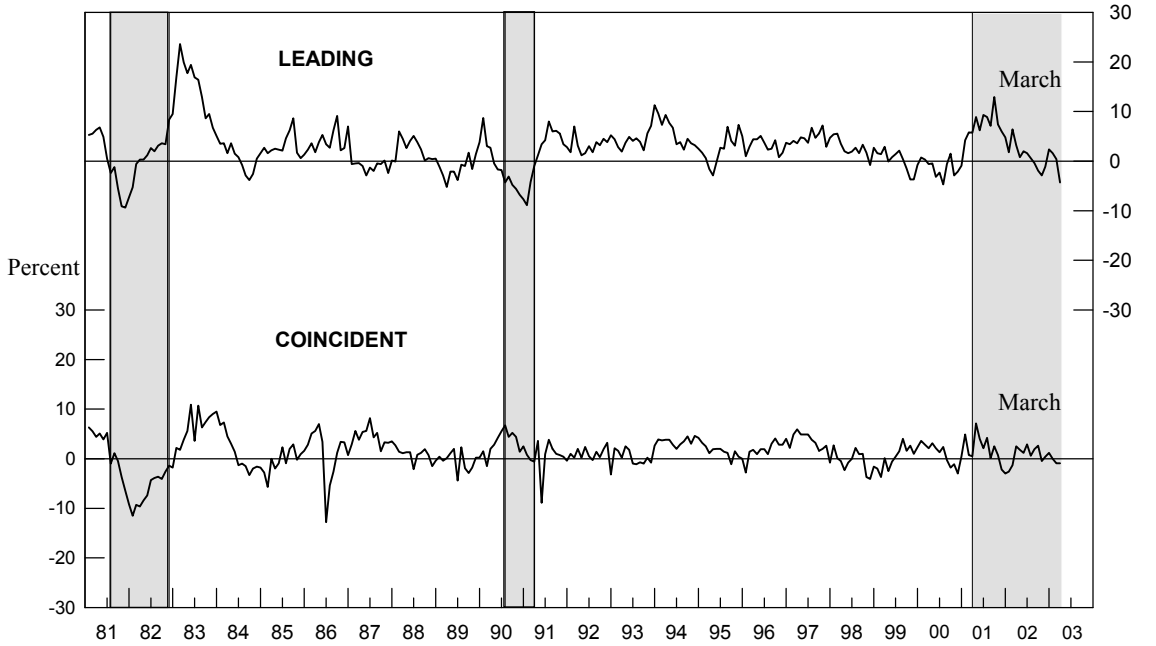
r: Revised

CHART 6.
ALUMINUM MILL PRODUCTS:
LEADING AND COINCIDENT INDEXES, 1981-2003



Shaded areas are business cycle recessions. Asterisks (*) signify peaks (the end of an expansion) and troughs (the end of a downturn) in the economic activity reflected by the indexes.

CHART 7.
ALUMINUM MILL PRODUCTS:
LEADING AND COINCIDENT GROWTH RATES, 1981-2003



Shaded areas are business cycle recessions.

The growth rates are expressed as compound annual rates based on the ratio of the current month's index to its average level during the preceding 12 months.

U.S. Geological Survey, May 2003

Table 8.
The Copper Industry Indexes and Growth Rates

	Leading Index		Coincident Index	
	(1977 = 100)	Growth Rate	(1977 = 100)	Growth Rate
2002				
April	119.3	7.4	116.1	1.4
May	119.5	6.5	115.8	0.7
June	118.5	4.2	115.3	-0.2
July	116.9	1.1	115.4	0.0
August	116.5	0.1	116.2	1.2
September	115.3	-2.0	115.3	-0.3
October	114.9	-3.0	115.4	-0.1
November	114.3	-4.3r	112.8	-4.2
December	115.8	-1.8	114.1r	-1.7r
2003				
January	115.2	-2.8	114.1r	-1.2r
February	114.6	-3.6r	114.4r	-0.8r
March	112.6	-6.2	112.7	-3.6

r: Revised

Note: Growth rates are expressed as compound annual rates based on the ratio of the current month's index to the average index during the preceding 12 months.

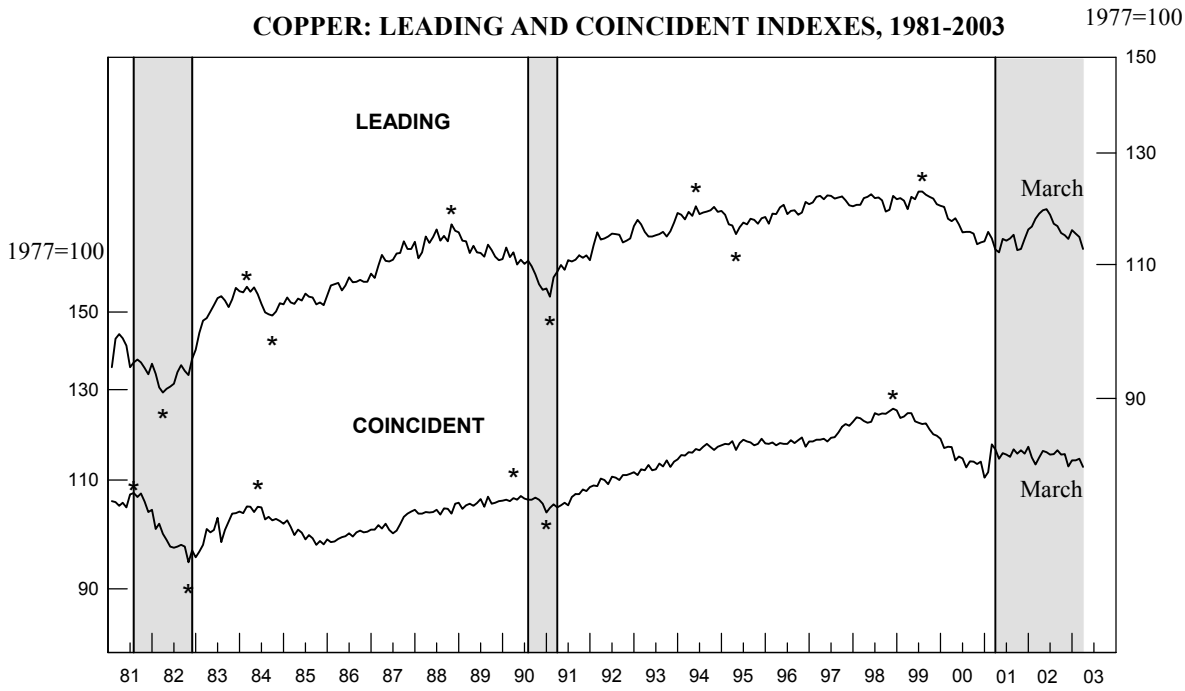
Table 9.
The Contribution of Each Copper Index Component to the Percent Change in the Index from the Previous Month

Leading Index	**February**	**March**
1. Average weekly overtime hours, rolling, drawing, and extruding of copper (SIC 3351)	0.6	-0.9
2. New orders, nonferrous metal products, (NAICS 3313, 3314, & 335929) 1982$	-0.7	0.1
3. S&P stock price index, building products companies	-0.3	0.0
4. LME spot price of primary copper	-0.1	-0.4
5. Index of new private housing units authorized by permit	0.1	-0.5
6. Spread between the U.S. 10-year Treasury Note and the federal funds rate	-0.1	-0.1
Trend adjustment	0.0	0.0
Percent change (except for rounding differences)	-0.5	-1.8
Coincident Index		
1. Industrial production index, primary smelting and refining of copper (NAICS 331411)	-0.2	0.0
2. Total employee hours, rolling, drawing, and extruding of copper (SIC 3351)	0.2r	-1.6
3. Copper refiners' shipments (short tons)	0.1	NA
Trend adjustment	0.1	0.1
Percent change (except for rounding differences)	0.2	-1.5

Sources: Leading: 1, Bureau of Labor Statistics; 2, U.S. Census Bureau and U.S. Geological Survey; 3, Standard & Poor's; 4, London Metal Exchange; 5, U.S. Census Bureau and U.S. Geological Survey; 6, Federal Reserve Board and U.S. Geological Survey. Coincident: 1, Federal Reserve Board; 2, Bureau of Labor Statistics; 3, American Bureau of Metal Statistics, Inc. and U.S. Geological Survey. All series are seasonally adjusted, except 3, 4, and 6 of the leading index.

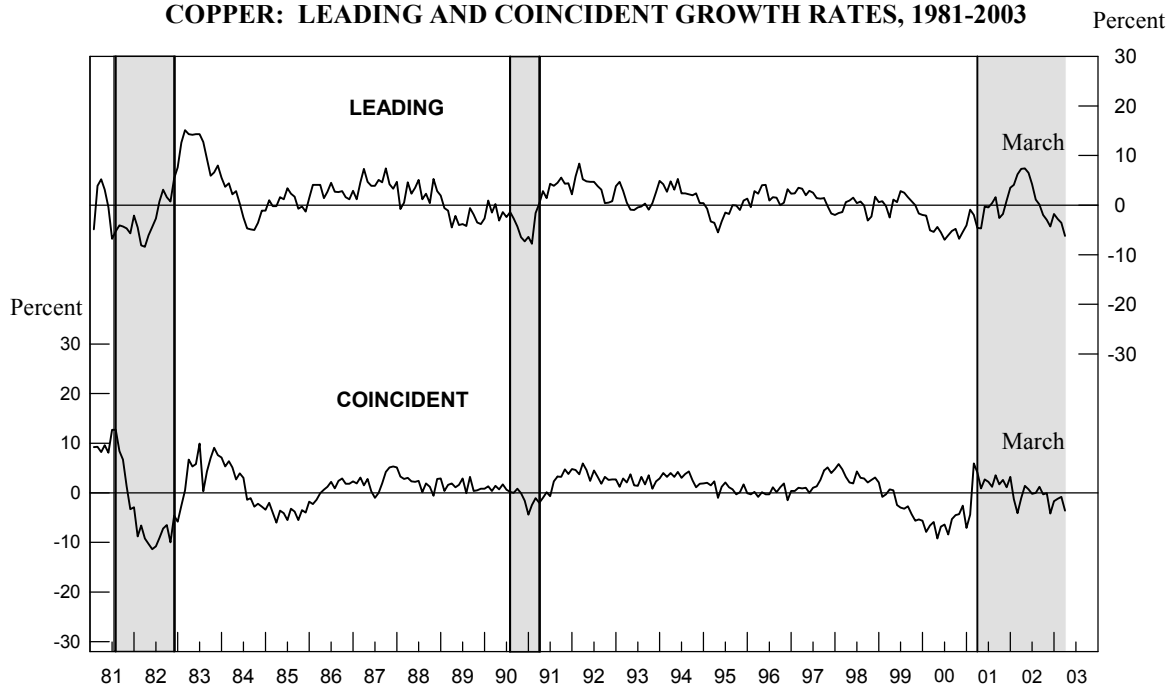
r: Revised

CHART 8.
COPPER: LEADING AND COINCIDENT INDEXES, 1981-2003



Shaded areas are business cycle recessions. Asterisks (*) signify peaks (the end of an expansion) and troughs (the end of a downturn) in the economic activity reflected by the indexes.

CHART 9.
COPPER: LEADING AND COINCIDENT GROWTH RATES, 1981-2003



Shaded areas are business cycle recessions.

The growth rates are expressed as compound annual rates based on the ratio of the current month's index to its average level during the preceding 12 months.

U.S. Geological Survey, May 2003

Table 10.
The Primary Aluminum Industry Indexes and Growth Rates

	Leading Index		Coincident Index	
	(1977 = 100)	Growth Rate	(1977 = 100)	Growth Rate
2002				
April	81.6	-3.4	72.7	-1.2
May	81.9	-1.9	73.7	2.4
June	84.3	4.3	74.7	5.7
July	83.6	2.9	76.0	9.3
August	82.1	-0.4	75.3	7.1
September	80.8	-2.8	75.4	6.9
October	82.3	0.8	78.5	14.9
November	83.8	3.9	79.4	15.5
December	84.9	6.1	79.8	14.8
2003				
January	85.0r	5.8r	79.2	10.8
February	85.6r	6.3r	79.3	9.2
March	86.0	6.5	78.2	4.6

r: Revised

Note: Growth rates are expressed as compound annual rates based on the ratio of the current month's index to the average index during the preceding 12 months.

Table 11.
The Contribution of Each Primary Aluminum Index Component to the Percent Change in the Index from the Previous Month

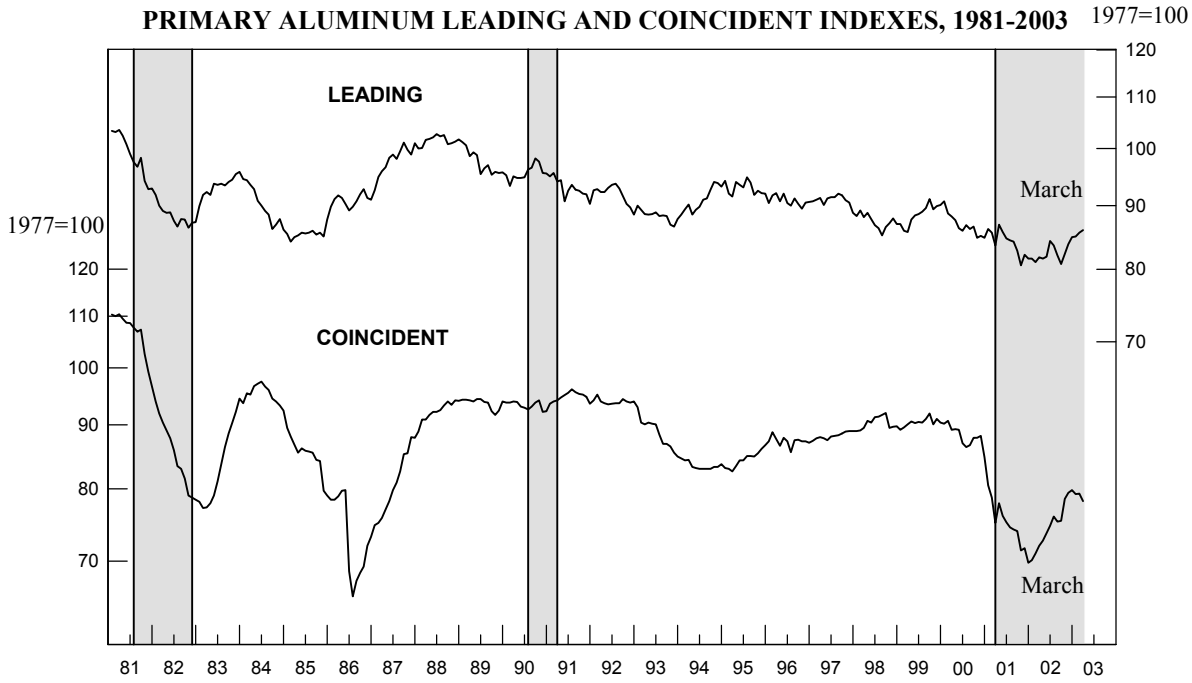
Leading Index	**February**	**March**
1. Average weekly hours, primary aluminum products (SIC 3334)	1.4	0.6
2. S&P stock price index, aluminum companies	-0.6	0.0
3. LME cash closing price for primary aluminum ($/ton)	0.2	-0.2
4. Industrial production index, misc. aluminum materials (NAICS 331315,9)	0.0r	-0.1
5. New orders, nonferrous metal products (NAICS 3313, 3314, & 335929) 1982$	-0.7r	0.1
6. Reciprocal, index of the trade-weighted average exchange value of the U.S. dollar against other major currencies	0.3	0.2
Trend adjustment	-0.1	-0.1
Percent change (except for rounding differences)	0.5	0.5
Coincident Index		
1. Production of primary aluminum (metric tons)	0.1	-0.8
2. Total employee hours, primary aluminum products, (SIC 3334)	0.1	-0.6
Trend adjustment	0.0	0.0
Percent change (except for rounding differences)	0.2	-1.4

Sources: Leading: 1, Bureau of Labor Statistics; 2, Standard & Poor's; 3, London Metal Exchange; 4, Federal Reserve Board; 5, U.S. Census Bureau and U.S. Geological Survey; 6, Federal Reserve Board and U.S. Geological Survey. Coincident: 1, The Aluminum Association, Inc. and U.S. Geological Survey and 2, Bureau of Labor Statistics and U.S. Geological Survey. All series are seasonally adjusted, except 2, 3, and 6 of the leading index.

r: Revised

CHART 10.

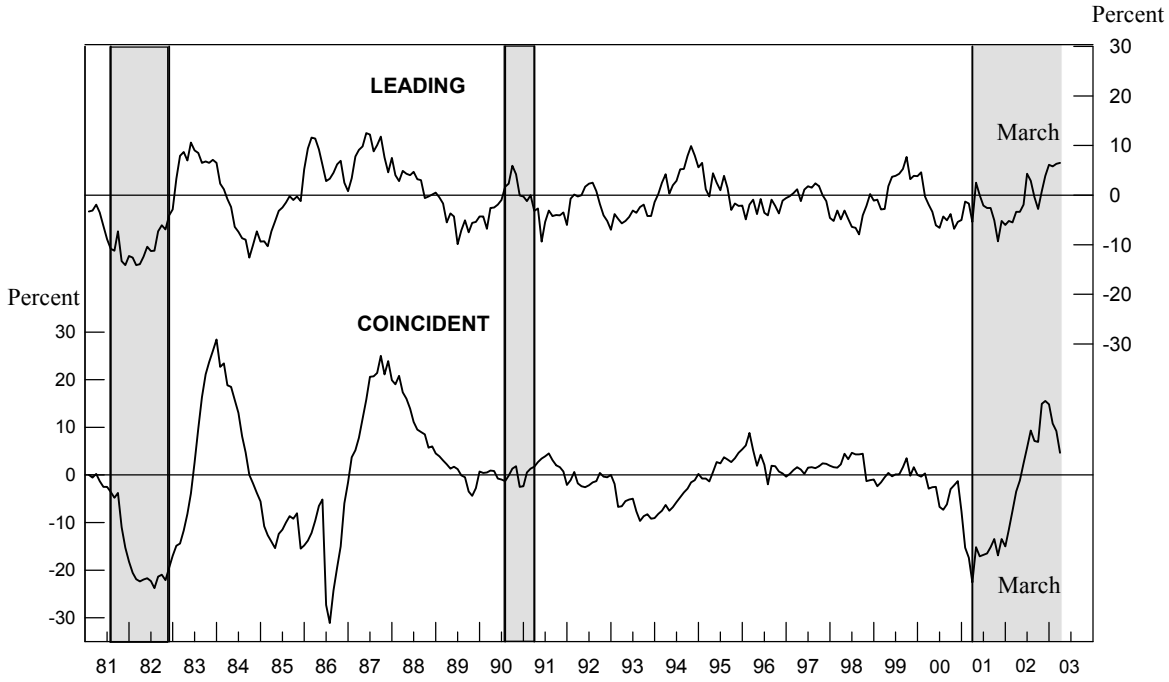
PRIMARY ALUMINUM LEADING AND COINCIDENT INDEXES, 1981-2003



Shaded areas are business cycle recessions.

CHART 11.

PRIMARY ALUMINUM LEADING AND COINCIDENT GROWTH RATES, 1981-2003



Shaded areas are business cycle recessions.

The growth rates are expressed as compound annual rates based on the ratio of the current month's index to its average level during the preceding 12 months.

U.S. Geological Survey, May 2003

Explanation

Each month, the U.S. Geological Survey tracks the effects of the business cycle on five U.S. metal industries by calculating and publishing composite indexes of leading and coincident indicators. Wesley Mitchell and Arthur Burns originated the cyclical-indicators approach for the economy as a whole at the National Bureau of Economic Research in the mid-1930s. Over subsequent decades this approach was developed and refined, mostly at the National Bureau, under the leadership of Geoffrey H. Moore.[1]

A business cycle can briefly be described as growth in the level of economic activity followed by a decline succeeded by further growth. These alternating periods of growth and decline do not occur at regular intervals. Composite indexes, however, can help determine when highs and lows in the cycle might occur. A composite index combines cyclical indicators of diverse economic activity into one index, giving decision makers and economists a single measure of how changes in the business cycle are affecting economic activity.

The indicators in the metal industry leading indexes historically give signals several months in advance of major changes in a coincident index, a measure of current metal industry activity. Indicators that make up the leading indexes are, for the most part, measures of anticipations or new commitments to various economic activities that can affect the metal industries in the months ahead.

Composite coincident indexes for the metal industries consist of indicators for production, shipments, and total employee hours worked. As such, the coincident indexes can be regarded as measures of the economic health of the metal industries.

The metal industry coincident indexes reflect industry activity classified by the U.S. Standard Industrial Classification (SIC) and the North American Industry Classification System (NAICS). Of the five metal industries, primary metals (NAICS 331) is the broadest, containing 25 different metal processing industries. Steel, aluminum, and copper are specific industries within the primary metals group.

The SIC was the main vehicle used by the U.S. Government and others in reporting industry economic statistics throughout most of the last century. Starting with the 1997 U.S. Economic Census, the U.S. Government began using the NAICS, which classifies economic data for industries in Canada, Mexico, and the United States. In general, metal industry indexes starting in 1997 begin to reflect the NAICS classification, while indexes for earlier years follow the SIC. Hence, composite indexes from 1997 forward are not entirely consistent with those of earlier years.

The largest change to primary metals because of the NAICS deals with other communication and energy wire manufacturing (NAICS 335929). Under NAICS, this manufacturing has been removed from primary metals and added to electrical equipment, appliance, and component manufacturing. Because monthly shipments and new orders for this wire are not available, the USGS is estimating their values from 1997 onward and adding them to the appropriate metal industry indicators and indexes to maintain consistency.

[1]**Business Cycle Indicators, A monthly report from The Conference Board** (March 1996).

There are other small changes to the primary metals industry because of the switch to the NAICS. Coke oven activity not done by steel mills, for example, is removed and alumina refining, a part of industrial inorganic chemical manufacturing under the SIC, is added. Since the historic trends of the composite indexes are not affected by these small changes, the USGS is not making specific adjustments to the indexes for them for the periods before and after 1997.

The metal industry leading indexes turn before their respective coincident indexes an average of 8 months for primary metals and 7 months for steel and copper. The average lead time for the primary aluminum leading index is 6 to 8 months, and the average lead time for the aluminum mill products leading index is 6 months.

The leading index of metal prices, also published in the *Metal Industry Indicators*, is designed to signal changes in a composite index of prices for primary aluminum, copper, lead, and zinc traded on the London Metal Exchange. On average, this leading index indicates significant changes in price growth about 8 months in advance.

The growth rate used in the *Metal Industry Indicators* is a 6-month smoothed growth rate at a compound annual rate, calculated from a moving average. Moving averages smooth fluctuations in data over time so that trends can be observed. The 6-month smoothed growth rate is based upon the ratio of the latest monthly value to the preceding 12-month moving average.

$$\left[\left(\frac{\textit{current value}}{\textit{preceding 12-month moving average}}\right)^{\frac{12}{6.5}} - 1.0\right] * 100$$

Because the interval between midpoints of the current month and the preceding 12 months is 6.5 months, the ratio is raised to the 12/6.5 power to derive a compound annual rate.

The growth rates measure the near-term industry trends. They, along with other information about the metal industries and the world economy, are the main tools used to determine the outlook of the industries. A 6-month smoothed growth rate above +1.0% usually means increasing growth; a rate below –1.0% usually means declining growth.

The next summary is scheduled for release on the World Wide Web at 10:00 a.m. EDT, Friday, June 20. The address for *Metal Industry Indicators* on the World Wide Web is: http://minerals.usgs.gov/minerals/pubs/mii/

The ***Metal Industry Indicators*** is produced at the U.S. Geological Survey by the Minerals Information Team. The report is prepared by Kenneth Beckman (703-648-4916; e-mail: kbeckman@usgs.gov), and Gail James (703-648-4915; e-mail: gjames@usgs.gov). The former Center for International Business Cycle Research, under the direction of Dr. Geoffrey H. Moore, and the former U.S. Bureau of Mines developed the metal industry leading and coincident indexes in the early 1990s. Customers can send mail concerning the *Metal Industry Indicators* to the following address:

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